NSF 23-584: IUSE: Innovation in Two-Year College STEM Education (ITYC)

Program Solicitation

Document Information

Document History
- **Posted:** May 8, 2023

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National Science Foundation
Directorate for STEM Education
  Division of Undergraduate Education

Full Proposal Deadline(s) (due by 5 p.m. submitter's local time):

December 13, 2023

Second Wednesday in December, Annually Thereafter

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Important Information And Revision Notes

This program solicitation replaces PD 21-7980. Proposers should pay close attention to the sections of the solicitation that deviate from the PAPPG, including eligibility, proposal preparation instructions, and additional solicitation specific review criteria.

The program is open to two-year colleges of higher education (either Associates College or Baccalaureate / Associates Colleges) that are accredited and offer undergraduate educational degree programs in science, technology, engineering, and mathematics (STEM).

Baccalaureate, Master's, and Doctoral Colleges and Universities may partner with a two-year college as a subaward or as the non-lead in a multi-institutional collaborative.

The term Innovation in this solicitation refers to new approaches to improving the STEM education enterprise, and/or new and creative ways to adapt and implement evidence-based practices in new contexts.

Any proposal submitted in response to this solicitation should be submitted in accordance with the *NSF Proposal & Award Policies & Procedures Guide* (PAPPG) that is in effect for the relevant due date to which the proposal is being submitted. The NSF PAPPG is regularly revised and it is the responsibility of the proposer to ensure that the proposal meets the requirements specified in this solicitation and the applicable version of the PAPPG. Submitting a proposal prior to a specified deadline does not negate this requirement.

Summary Of Program Requirements

General Information

Program Title:

      IUSE: Innovation in Two-Year College STEM Education (ITYC)

Synopsis of Program:

      The National Science Foundation (NSF) plays a prominent role in the improvement of undergraduate STEM education at the Nation's colleges and universities. Through the IUSE: Innovation in Two-Year College STEM Education (ITYC) program, the agency seeks to extend this effort by making an intentional investment in the country's two-year institutions of higher education, or two-year colleges. **The twin goals of the ITYC program are to (1) center students in the effort to advance innovation, promote equitable outcomes and broaden participation for all students in STEM education at two-year colleges, and (2) enhance the capacity of two-year colleges to harness the talent and potential of their diverse student and faculty population through innovative disciplinary, multi-department, and college-wide efforts.** These goals will be achieved by investing in projects at two-year colleges that contribute to student success in STEM-based foundational courses and academic pathways for both

majors and non-majors. Project activities may be in any discipline that is currently supported by NSF funding, which includes the social, behavioral, and economic sciences. Collectively, projects in the ITYC program will make progress towards ensuring that two-year college students and faculty have the resources to fully participate in and contribute to the broader STEM enterprise.

Aligned with the goals above, the ITYC program features two tracks: (1) **A Focus on the Academic Experiences of Two-Year College Students and** (2) **Leveraging Institutional Strengths and Innovation.** Each Track can support projects requesting up to $500,000 for a duration of up to three years. For institutions that have not received NSF funding in the past five years, an additional $100,000 may be added to the budget which may be used by the institution to support and carry out grant-funded activities over four years. This would result in a total maximum budget of $600,000 for a project over four years. Institutions that have been funded as part of a collaborative award with their own NSF Award Number are not eligible for this incentive, however, institutions that have had a subaward from another institution are eligible.

This program is open to two-year colleges, which includes the following institutions, as described by Carnegie Classifications:

- Associates Colleges: Institutions at which the highest-level degree awarded is an associate degree. This may include transfer as well a career and technical oriented colleges.
- Baccalaureate / Associates Colleges: Institutions that award at least one baccalaureate degree but confer at least 50% of their degrees at the associate level.

The ITYC program is aligned with NSF's Improving Undergraduate STEM Education (IUSE) framework, which is a comprehensive effort to accelerate improvements in the quality and effectiveness of undergraduate education in STEM fields.

Cognizant Program Officer(s):

Please note that the following information is current at the time of publishing. See program website for any updates to the points of contact.

- General inquires to be addressed to, telephone: (703) 292-8670, email: iuse@nsf.gov

Applicable Catalog of Federal Domestic Assistance (CFDA) Number(s):

- 47.076 --- STEM Education

Award Information

Anticipated Type of Award: Standard Grant or Continuing Grant

Estimated Number of Awards: 15 to 20

The program estimates making awards for up to 20 projects across both tracks.

Anticipated Funding Amount: $10,000,000

The estimated program budget, number of awards, and average award size/duration are subject to the availability of funds.

Eligibility Information

Who May Submit Proposals:

Proposals may only be submitted by the following:

- Proposals may only be submitted by two-year colleges of higher education (either Associates College or Baccalaureate / Associates Colleges) that are accredited and offer undergraduate educational degree programs in science, technology, engineering, and mathematics (STEM). Baccalaureate, Master's, and Doctoral institutions, and Professional Organizations may partner with a two-year college as a subaward or as a collaborator. For all collaborative proposals, two-year colleges must be the lead organization. Please see PAPPG Chapter II.E.3 for additional guidance on collaborative proposals.

Who May Serve as PI:

There are no restrictions or limits.

Limit on Number of Proposals per Organization:

There are no restrictions or limits.

Limit on Number of Proposals per PI or co-PI:

There are no restrictions or limits.

Proposal Preparation and Submission Instructions

A. Proposal Preparation Instructions

- **Letters of Intent:** Not required
- **Preliminary Proposal Submission:** Not required
- **Full Proposals:**
  - Full Proposals submitted via Research.gov: *NSF Proposal and Award Policies and Procedures Guide* (PAPPG) guidelines apply. The complete text of the PAPPG is available electronically on the NSF website at: https://www.nsf.gov/publications/pub_summ.jsp?ods_key=pappg.
  - Full Proposals submitted via Grants.gov: *NSF Grants.gov Application Guide: A Guide for the Preparation and Submission of NSF Applications via Grants.gov* guidelines apply (Note: The *NSF Grants.gov Application Guide* is available on the Grants.gov website and on the NSF website at: https://www.nsf.gov/publications/pub_summ.jsp?ods_key=grantsgovguide).

B. Budgetary Information

- **Cost Sharing Requirements:**

  Inclusion of voluntary committed cost sharing is prohibited.

- **Indirect Cost (F&A) Limitations:**

  Not Applicable

- **Other Budgetary Limitations:**

  Other budgetary limitations apply. Please see the full text of this solicitation for further information.

C. Due Dates

- **Full Proposal Deadline(s)** (due by 5 p.m. submitter's local time):

  December 13, 2023

  Second Wednesday in December, Annually Thereafter

Proposal Review Information Criteria

Merit Review Criteria:

National Science Board approved criteria. Additional merit review criteria apply. Please see the full text of this solicitation for further information.

Award Administration Information

Award Conditions:

Standard NSF award conditions apply.

Reporting Requirements:

Standard NSF reporting requirements apply.

I. Introduction

NSF's Directorate for STEM Education (EDU) seeks to address the specific opportunities and challenges evident at two-year institutions of higher education in its effort to accelerate the impact of emerging and evidence-based practices in undergraduate STEM education across the country. This solicitation aligns with the NSF 2022-2026 Strategic Plan[1] and the National Science Board (NSB) Vision 2030[2] that both call for accessibility and inclusivity across the STEM education landscape in pursuit of a STEM workforce that reflects the diversity of our society. The ITYC program recognizes that two-year institutions of higher education serve diverse student populations[3] and that their faculty, staff, and administrators are uniquely positioned to create innovative solutions for addressing NSF's priority to achieve STEM equity and build a diverse workforce. The NSF also appreciates that two-year colleges are distinct in the national undergraduate STEM education ecosystem and play a pivotal role in providing affordable access to higher education and career-relevant STEM pathways to the workforce[4].

There are more than 1,000 unique public and independent two-year colleges throughout the country, and these institutions serve as important entry points for many students who want to earn a STEM degree. In the Fall of 2020, for example, at least 6.2 million credit-earning students attended two-year colleges either full- or part-time to obtain academic credentials and/or transfer to four-year colleges and universities, making up 39% of all undergraduates in the United States[5]. Among students who earned a Science and Engineering Bachelor's degrees almost half (47%) had completed some coursework at two-year colleges[3]. Additionally, students from groups that have been underrepresented in STEM are more likely to have attended two-year colleges and to have earned an associate degree as part of their education[6]. Further, nearly one third of two-year colleges are Minority Serving Institutions (MSIs) which constitute over half (55%) of the total MSIs in the United States[7]. As such, two-year colleges represent a wealth of STEM potential and are poised to be major contributors to the diversity of STEM graduates of the future.

Through its investments, the ITYC program seeks to promote bold, potentially transformative projects that:

- **center students in the effort to advance innovation, promote equitable outcomes and broaden participation for all students in STEM education at two-year colleges**, and
- **enhance the capacity of two-year colleges to harness the talent and potential of their diverse student and faculty populations through innovative disciplinary, multi-department, and college-wide projects.**

These goals may be achieved through projects in STEM fields[8] that address the experiences, pathways and courses of STEM majors and non-majors at two-year colleges. Project teams are encouraged to leverage the expertise that result from authentic partnerships across disciplines, institutions, and communities and to establish collaborations, as appropriate, with components of the national network of NSF INCLUDES projects[9].

The ITYC program addresses undergraduate STEM education and therefore is aligned with the NSF's Improving Undergraduate STEM Education (IUSE) framework. More information about the IUSE program can be found on the IUSE:EDU program website. Depending on the scope and nature of the project, investigators should consider applying to IUSE:EDU.

The ITYC program seeks to support the advancement of STEM education in general education and STEM transfer courses and pathways at two-year colleges. The Advanced Technological Education (ATE) program supports projects that improve the education of technicians in science and engineering at two-year colleges. For support with projects that address technical education, please see the ATE program website for more information.

II. Program Description

A. Program Overview

The ITYC program aims to support potentially transformative projects that will advance innovative evidence-based practices in undergraduate STEM education at two-year colleges that are in line with the program goals specified in the previous section. The program features two Tracks: **(1) A Focus on the Academic Experiences of Two-Year College Students** and **(2) Leveraging Institutional Strengths and Innovation.**

Within these two Tracks, ITYC projects may focus on developing innovative materials, practices, and partnerships at the frontier of STEM education, and/or projects that adapt and implement strategies that reflect upon proven or promising approaches from previous NSF projects or from other sources in the STEM education community[10]. In either case, projects must be in STEM fields, including emerging and converging STEM areas, that support the advancement of courses, pathways, or co-curricular activities for students enrolled as STEM majors and non-majors at two-year colleges. Projects are expected to leverage prior fundamental and/or applied research in STEM education and provide theoretical and empirical justification for all proposed activities. Projects that propose innovative approaches that are designed to address gaps in the research literature or educational practice or are based on ideas that have not been tried out in STEM education are encouraged.

The ITYC program recognizes that students at two-year colleges follow a variety of academic pathways that may result in certificates, degrees, direct entrance to the workforce, or transfer to four-year institutions in lieu of two-year college graduation. Successful ITYC proposals will therefore utilize or develop student-centered practices that embrace the numerous on-ramps, pathways and career pivots that shape the two-year college student experience. These proposals may include but are not limited to projects that seek to transform gateway STEM courses, develop and implement authentic research experiences, utilize effective mentorship models, connect STEM courses to the local community through experiential learning opportunities, leverage students' diverse backgrounds and experiences, and/or generate knowledge about factors associated with the impact of these advances in the context of two-year colleges.

Additionally, the ITYC program supports authentic partnerships that build an institution's capacity to support students by focusing on activities that may include but are not limited to faculty professional development, the establishment of communities of practice, development of innovative models for on- and off-ramps, and many other structural innovations that contribute to the goals of the ITYC program. Proposers are encouraged to use disaggregated institutional data to address the specific needs of their student population or to justify the proposed enhancements in student experiences and/or institutional capacity-building activities.

Proposals may include the procurement of equipment (up to 30% of the project budget) to support STEM coursework where student access to specialized equipment will enhance their academic experience. Proposals that include equipment should clearly describe how it will advance STEM education at the two-year college and provide a plan for sustaining these activities and the equipment beyond the funding period.

B. Program Tracks

The ITYC program invites proposals to two tracks: 1) **A Focus on the Academic Experiences of Two-Year College Students** and 2) **Leveraging Institutional Strengths and Innovation**. Planning proposals for both tracks are also welcome as a part of this program.

Track 1: A Focus on the Academic Experiences of Two-Year College Students

Track 1 projects involve direct engagement with students at two-year colleges and focus on developing and/or adapting approaches to promote successful outcomes in STEM courses by placing students at the center of the effort. These

projects hinge on the recognition that any student at a two-year college may sit at the intersection of many distinct identities that may not be adequately described by age or other traditional demographics alone. Student populations could include full and part-time students, students enrolled at multiple colleges, and students participating in dual enrollment and dual credit programs. The faculty, staff and administration of two-year colleges are invited to develop projects that recognize the potential within this unique population to optimize the student experience in STEM courses and pathways. Stipends for student time and engagement with project activities are encouraged.

Examples of Track 1 projects include, but are not limited to, the transformation of introductory, developmental or laboratory courses for both STEM majors and non-majors. This may include development and/or implementation of active learning approaches, project-based experiences, contextualized STEM learning activities that provide relevance and connections to students' lived experiences, and school/work-life balance. Projects aimed at developing and/or implementing culturally responsive materials and pedagogical practices that effectively increase belonging, identity, participation, and success in these same introductory courses are particularly encouraged. Projects that focus on students in these courses should consider the prior experiences and assets of their student population, and the metrics institutions will use to measure progress.

Proposed projects to Track 1 may also seek to develop authentic research experiences in courses and/or generate models for undergraduate research experiences specific to the two-year college context. Projects may also focus on engaging student voices to guide the design of academic experiences that connect STEM education to students' communities. This may include project activities such as service-learning initiatives, community-based projects, internships, and other experiential learning opportunities which may involve early exposure to emerging scientific fields in work-based settings.

Alternatively, projects might engage in STEM education research conducted by faculty and other researchers on cognitive and non-cognitive factors associated with two-year college student learning, identity, and motivation. Researchers/faculty may also engage in discipline-based education research (DBER) that generates knowledge specific to the advancement of STEM education at two-year colleges.

Track 1 projects have a maximum award of $500,000 for up to three years. Institutions that have not received NSF funding in the past 5 years are eligible for a maximum of $600,000 for up to four years. A prior subaward from a separate lead institution does not exclude an institution from eligibility for this incentive. Institutions eligible for this incentive would not have an award or collaborative award with their own award number that started in the past five years.

Track 2: Leveraging Institutional Strengths and Innovation

Proposals submitted under this category are intended to foster single department, multi-department, or college-wide projects to accelerate innovation and build appropriate capacity in the targeted unit to enable innovation in STEM education at two-year colleges. Track 2 projects should promote student success and increase participation in STEM through novel approaches or through existing practices already known to positively impact student participation and retention outcomes. Track 2 projects may achieve this by leveraging institutional strengths or by fostering partnerships with external stakeholders that expand departmental and/or institutional capacity and impact student success.

Examples of Track 2 projects include, but are not limited to, professional development of faculty, staff, and administrators, expanding the roles of teaching and learning centers, or establishing a community of practice within or among institutions. Professional development for two-year college faculty, for example, may focus on building expertise in a wide range of emerging practices such as implementing equity-oriented STEM education approaches, creating novel mechanisms to identify talent and recruit students into STEM programs, or enhancing capacity to conduct STEM education research. In particular, proposals that aim to develop innovative strategies that effectively engage part-time faculty in these professional development activities are supported and encouraged.

Track 2 also promotes the successful advancement of students through critical transitions, such as the transfer of students from two-year to four-year institutions and the transition from secondary education to two-year colleges. Track 2 projects may, for example, seek to create innovative dual credit, dual enrollment, or bridge programs by partnering with local school districts to effectively support students through this transition. Proposed projects may also create inter-

institutional partnerships for designing pathways or bridge programs to support students as they transition to a four-year institution seeking a bachelor's degree or to a work-based setting in pursuit of a career in STEM.

Track 2 projects have a maximum award of $500,000 for up to three years. Institutions that have not received NSF funding in the past 5 years are eligible for a maximum of $600,000 for up to four years. A prior subaward from a separate lead institution does not exclude an institution from eligibility for this incentive. Institutions eligible for this incentive would not have an award or collaborative award with their own award number that started in the past five years.

Research and Practice: The ITYC program welcomes proposals to both Track 1 and Track 2 that generate new knowledge as part of a research study about factors associated with the success of students who are pursuing their education at two-year institutions. If included, the proposed studies must address problems of practical significance, be informed by the research literature, driven by well-focused research question(s), aligned with research methods including justification, and be designed to bridge the gap between research and practice[11]. The program accepts a wide range of methodological approaches that are aligned with the research questions and are appropriate for answering them. Research and Practice Proposals can be submitted under either Track 1 or Track 2 based on alignment of the proposal with the selected track.

Partnerships and Collaborations: Mutually beneficial partnerships or collaborations within and across institution types are supported in both Track 1 and Track 2. For example, a collaboration across STEM disciplines within the proposing institution or a partnership among several two-year colleges implementing similar interventions could strengthen the ability of these departments and/or institutions to share resources and expertise and could increase the amount of new knowledge produced. Partnerships with 4-year colleges and universities could create clear transfer pathways for two-year college students that would not otherwise exist or could leverage additional expertise and resources. Collaborations with work-place partners could extend STEM pathways directly to career opportunities. Please see the PAPPG Chapter II.D.3 for additional guidance on preparing collaborative proposals. In all collaborative proposals to Track 1 and Track 2, two-year colleges must be the lead institution. Other types of institutions may serve as collaborators as necessary for the success of the project. All collaborative proposals will require a robust management plan that describes the role of contributors in leadership positions from each institution.

C. Key Project Elements of ITYC Projects

Successful proposals are likely to include project descriptions that contain these key elements:

1. Knowledge base for the project: Proposals to both tracks should leverage prior research in STEM education, provide theoretical and empirical justification for proposed projects as needed and/or connect project activities to the culture and participants involved. This may be accomplished through a combination of STEM education literature, institutional data, summaries of findings from prior work, or relevant cultural frameworks. If the project builds from previous NSF funded work, a summary of the work, findings, and lessons learned with respect to Intellectual Merit and Broader Impacts must be included.

2. Generation of Knowledge: Successful projects to both tracks must clearly describe efforts to create knowledge. This can be achieved through assessment efforts, project evaluation, culturally relevant approaches and/or through research. **NOTE: The ITYC program supports research but does NOT require a research component to be included in every project.**

3. Project Evaluation: All ITYC-funded work must be evaluated. The evaluator must be external to or independent from the project team but may be an individual from the same institution who has expertise in evaluation and/or assessment. Evaluation should be tied to goals and activities described in the project timeline and aligned with expected outcomes. See Section V. below for more information about project evaluation requirements and recommendations.

4. Timeline: All projects should include a project timeline that is clearly aligned with the goals, objectives, and activities of the project.

5. Dissemination: All projects should contain a plan for dissemination of project findings that target appropriate audiences. Dissemination efforts may include, but not limited to, presentation of results in public spaces such as

conferences and workshops, publication of findings and materials, and use of social media and other electronic modes for dissemination of scholarly work. Creative approaches that reach broader audiences are strongly encouraged.

6.Sustainability: Proposals to this program should communicate a reasonable plan for sustainability. It is expected that some aspects of the project will be sustained or institutionalized past the period of award funding.

For additional guidance on ITYC proposal preparation, see Section V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS below.

D. Information about Previous Awards

NSF's web site (https://www.nsf.gov) provides an Awards Search feature that allows customized searches of NSF's award database.

E. Other Types of Proposals

The ITYC program also accepts the following types of proposals.

Planning Projects: ITYC welcomes planning proposals submitted at any time during the year. This type of proposal may be submitted by two-year colleges of higher education (either Associates College or Baccalaureate / Associates Colleges) that are accredited and offer undergraduate educational degree programs in science, technology, engineering, and mathematics (STEM). **A consultation with a program officer is required prior to proposal submission.** If the program director approves submission of a planning proposal, the proposal must be prepared in accordance with the instructions for the planning type of proposal contained in Chapter II.F of the PAPPG and must be submitted through Research.gov. Proposers should select the current PAPPG as the funding opportunity in Research.gov and direct the proposal to the ITYC program in the Division of Undergraduate Education (DUE) in the Directorate for STEM Education (EDU).

Conferences and Workshops: Proposals for conferences and workshops addressing critical challenges in undergraduate STEM education and broadening participation at two-year colleges as well as issues related to student retention, completion and transfer are encouraged. Conference proposals that promote building communities among two-year colleges where resources can be leveraged are welcomed. Workshops aimed at expanding two-year college expertise to engage in STEM education improvement and research are encouraged. This type of proposal may be submitted by two-year colleges as well as all other organizations identified in PAPPG Chapter I.E. Conference proposals are accepted at any time during the year, but proposers should plan on at least a 10-month lead time to allow for review of the proposal. **A consultation with a program officer is required prior to proposal submission.** If the program director approves submission of a conference proposal, the proposal must be prepared in accordance with the instructions for the conference type of proposal contained in Chapter II.F of the PAPPG and must be submitted through Research.gov. Proposers should select the current PAPPG as the funding opportunity in Research.gov and direct the proposal to the ITYC program in the Division of Undergraduate Education (DUE) in the Directorate for STEM Education (EDU).

References and Notes

[1] Leading the World in Discovery and Innovation, STEM Talent Development and the Delivery of Benefits from Research: *NSF Strategic Plan 2022-2026*.

[2] Vision 2030, *National Science Board*. NSB-2020-15. https://www.nsf.gov/nsb/publications/2020/nsb202015.pdf.

[3] Foley D, Milan L, Hamrick K; National Center for Science and Engineering Statistics (NCSES). 2020. *The Increasing Role of Community Colleges among Bachelor's Degree Recipients: Findings from the 2019 National Survey of College Graduates.* NSF 21-309. Alexandria, VA: National Science Foundation. https://ncses.nsf.gov/pubs/nsf21309/.

[4] The Economic Value of America's Community Colleges. 2022. Report from the American Association of Community Colleges. https://www.aacc.nche.edu/2022/11/29/the-economic-value-of-americas-community-colleges-report/ ↗.

[5] American Association of Community Colleges Fast Facts. 2022. https://www.aacc.nche.edu/2022/02/28/42888/ ↗.

[6] National Science Board, National Science Foundation. 2022. Higher Education in Science and Engineering. Science and Engineering Indicators 2022. NSB-2022-3. Alexandria, VA. https://ncses.nsf.gov/pubs/nsb20223/.

[7] National Academies of Sciences, Engineering, and Medicine. 2019. Minority Serving Institutions: Americas Underutilized Resource for Strengthening the STEM Workforce. Washington, DC: The National Academies Press. https://doi.org/10.17226/25257 ⬈.

[8] All STEM fields supported by NSF are also supported by the ITYC program including the learning, social, behavioral, and economic sciences.

[9] NSF INCLUDES Initiative. https://www.nsf.gov/news/special_reports/big_ideas/includes.jsp.

[10] NSF-IES Companion Guidelines on Replication & Reproducibility in Education Research. NSF 19-022. https://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf19022

[11]NSF-IES Common Guidelines for Education Research and Development. NSF 13-126. https://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf13126

III. Award Information

NSF anticipates that approximately $10 million will be available for new awards in this program per fiscal year. The estimated program budget, number of awards, and average award size/duration are subject to the availability of funds and the quality of proposals received.

Anticipated Type of Award: Standard Grant or Continuing Grant

Estimated Number of Awards: 15-20

The program estimates making awards for up to 20 projects across both tracks.

IV. Eligibility Information

Who May Submit Proposals:

Proposals may only be submitted by the following:

- Proposals may only be submitted by two-year colleges of higher education (either Associates College or Baccalaureate / Associates Colleges) that are accredited and offer undergraduate educational degree programs in science, technology, engineering, and mathematics (STEM). Baccalaureate, Master's, and Doctoral institutions, and Professional Organizations may partner with a two-year college as a subaward or as a collaborator. For all collaborative proposals, two-year colleges must be the lead organization. Please see PAPPG Chapter II.E.3 for additional guidance on collaborative proposals.

Who May Serve as PI:

There are no restrictions or limits.

Limit on Number of Proposals per Organization:

There are no restrictions or limits.

Limit on Number of Proposals per PI or co-PI:

There are no restrictions or limits.

Additional Eligibility Info:

The ITYC program also accepts planning and conference proposals throughout the year. See Section II.E of this solicitation for additional information about eligibility and guidance on the preparation and submission of these types of proposals.

V. Proposal Preparation And Submission Instructions

A. Proposal Preparation Instructions

Full Proposal Preparation Instructions: Proposers may opt to submit proposals in response to this Program Solicitation via Research.gov or Grants.gov.

- Full Proposals submitted via Research.gov: Proposals submitted in response to this program solicitation should be prepared and submitted in accordance with the general guidelines contained in the *NSF Proposal and Award Policies and Procedures Guide* (PAPPG). The complete text of the PAPPG is available electronically on the NSF website at: https://www.nsf.gov/publications/pub_summ.jsp?ods_key=pappg. Paper copies of the PAPPG may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-8134 or by e-mail from nsfpubs@nsf.gov. The Prepare New Proposal setup will prompt you for the program solicitation number.

- Full proposals submitted via Grants.gov: Proposals submitted in response to this program solicitation via Grants.gov should be prepared and submitted in accordance with the *NSF Grants.gov Application Guide: A Guide for the Preparation and Submission of NSF Applications via Grants.gov*. The complete text of the *NSF Grants.gov Application Guide* is available on the Grants.gov website and on the NSF website at: (https://www.nsf.gov/publications/pub_summ.jsp?ods_key=grantsgovguide). To obtain copies of the Application Guide and Application Forms Package, click on the Apply tab on the Grants.gov site, then click on the Apply Step 1: Download a Grant Application Package and Application Instructions link and enter the funding opportunity number, (the program solicitation number without the NSF prefix) and press the Download Package button. Paper copies of the Grants.gov Application Guide also may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-8134 or by e-mail from nsfpubs@nsf.gov.

In determining which method to utilize in the electronic preparation and submission of the proposal, please note the following:

Collaborative Proposals. All collaborative proposals submitted as separate submissions from multiple organizations must be submitted via Research.gov. PAPPG Chapter II.E.3 provides additional information on collaborative proposals.

See PAPPG Chapter II.D.2 for guidance on the required sections of a full research proposal submitted to NSF. Please note that the proposal preparation instructions provided in this program solicitation may deviate from the PAPPG instructions.

Full Proposal Content

The following instructions supplement guidelines in the PAPPG and NSF Grants.gov Application Guide.

Proposal Set-Up: Select "Prepare New Full Proposal" in Research.gov. Search for and select this solicitation title in Step One of the Full Proposal wizard and then select "DUE- Division of Undergraduate Education" as the Division and ITYC as the Program. Select the "Research" proposal type for all tracks.

1. Title

An informative title for the proposed ITYC project must be provided on the appropriate line. Please use the full project title and refrain from using the acronym, "NSF," or your institution's name in the project title.

2. Project Data Form

The information on this form is used to direct the proposal to appropriate reviewers and to determine the characteristics of NSF-supported projects. Take special care to identify the proper track for your proposal in Item 1 on the form. For any audience code(s) marked in Item F (e.g., women, minorities, persons with disabilities), include in the Project Description a substantive discussion of the specific strategies that the project will employ to affect the audience(s). Note: In

Research.gov, the Project Data Form will show up in the list of required Proposal Sections for your proposal only after you have selected the correct Funding Opportunity Number in Step 1 of the Proposal Creation Wizard. Grants.gov users should refer to Section VI.5. of the NSF Grants.gov Application Guide for specific instructions on how to submit the Project Data Form. Please note that this form is distinct from the Institutional Data Narrative, described in Supplementary Documentation.

3. Cover Sheet

Review the regulations regarding Human Subjects (45 CFR 690.101-124). Please note that Human Subjects regulations also govern activities that have to do with safeguarding individually identifiable information such as student and faculty surveys and data. Therefore, projects submitted to this program should be reviewed by the Human Subjects Institutional Review Board (IRB) for the institution or outside the institution. Depending on the status of this review process, please indicate on the cover sheet that the review is pending, exempt or approved. If the IRB has already given approval of the activities, please include a letter from the IRB and indicate the expiration date of the IRB approval on the cover sheet. Obtaining IRB approval may occur after proposal submission and outside of the institution when necessary. Please note that an award cannot be made unless the IRB process has been completed and documentation has been received by the program director prior to recommending the award.

4. Project Summary

Each proposal must have a summary of the proposed project of not more than one page in length. The Project Summary should be informative and understandable to a range of practitioners/instructors, researchers, evaluators, practitioners, equity experts, and scientific experts working in the STEM Education field. The Project Summary must consist of the following three sections:

Overview: Describe the disciplinary focus (or foci) of the proposed project, the kinds of activities to be undertaken (e.g. educational materials development, adaptation and implementation, professional development for educators), and a statement of objectives and approaches/methods to be employed.

Intellectual Merit: Describe the potential of the proposed project to advance knowledge through practice or research.

Broader Impacts: Describe the potential of the proposed activity to benefit society and contribute to the achievement of specific, desired societal outcomes.

5. Project Description (Narrative)

The project description must follow the requirements outlined in the NSF PAPPG and this solicitation. The narrative is limited to 15 single-spaced pages. The Project Description must explain the project's motivating rationale, goals, objectives, deliverables, and activities; the timetable; the management plan; the roles and responsibilities of the PI, co-PI(s), and other senior personnel; the plan for sustainability after the period of NSF funding; the evaluation plan (see below for details); and the dissemination plan. Submission of the evaluation plan in supplementary documents is not allowable and such proposals will be subject to return without review as they will not meet the 15-page project description requirement.

Broader Impacts: Please note that per guidance in Chapter II of the NSF PAPPG, the Project Description must contain a separate section within the narrative labeled "Broader Impacts." This section should provide a discussion of the Broader Impacts of the proposed activities. Proposers may decide where to include this section within the Project Description. In addition to a section on Broader Impacts, all the following headings in bold should be included in the submitted Project Description:

Project Rationale, Significance and Objectives

The proposal should contain specific objectives that reflect the goals of the ITYC program. The project rationale must also build a compelling case for the proposed work, its approach, and how the work will advance knowledge regarding STEM education at two-year colleges. Proposals are expected to leverage the existing knowledge base for the project, provide theoretical and empirical justification for proposed projects as needed and/or connect project activities to the culture and

participants involved. This may be accomplished through a combination of STEM education literature, institutional data, summaries of findings from prior work and/or relevant cultural frameworks.

Project Design

The proposal should detail how the project will respond to the goals of the ITYC program. The narrative should contain sufficient details about the approach, activities, outputs/outcomes, STEM content area(s), and target audience(s). Project activities should be clearly aligned with the project's objectives and potential outcomes. If fundamental or applied research is included in the project (not required), the proposed study must be driven by well-focused research question(s), aligned with research methods with justification, and designed to bridge the gap between research and practices.

Timeline

All projects should include a project timeline that is clearly aligned with the goals, objectives, and activities of the project.

Generation of Knowledge

All ITYC proposals must clearly describe efforts to generate knowledge through assessment, project evaluation, or other culturally relevant methodologies applicable to the proposing institution. Projects must be situated in the practice, literature, and theory in a two-year college STEM education context and address questions of significance to the two-year college community.

The project team should be directly engaged in creating knowledge. Assessing impact of efforts as part of knowledge generation may be carried out by the PI and CoPIs or in partnership with an education researcher, evaluator, institutional research offices or other colleagues with relevant expertise.

Project evaluation can provide the information needed to satisfy the requirement to generate knowledge. In instances in which the advancement of knowledge is proposed via evaluation, a direct statement about how this will be accomplished is required. The proposal must clearly indicate how the project team will work directly with the evaluator to coordinate data collection, analysis/interpretation, and reporting. The proposal must also describe how this approach will advance understanding of STEM education in a two-year college context.

Providing a clear statement describing the alignment among the proposal objectives, knowledge building and project outcomes is recommended. A logic model or framework to illustrate coherence and alignment is recommended.

Project Evaluation

All ITYC-funded work must be evaluated. **The evaluator must be external to or independent from the project team but may be an individual from the same institution who has expertise in evaluation and assessment. A description of how the project team will ensure the independence of the evaluation is recommended**. It is also recommended that the evaluator be named in the proposal and a Biographical Sketch included with the proposal's supplementary documents. If the submitting organization opts to hire an external evaluator and requires evaluation consultants to be selected through a competitive bid process after an award is made, the proposer must mention the policy and describe the plans to select and collaborate with the evaluator once an award is made.

All Evaluation plans in ITYC proposals should indicate the following:

- Aspects of the project that will be evaluated: This may be expressed as evaluation questions that frame the evaluative inquiry or criteria that define the dimensions of project quality that will be investigated. The evaluation must address both project implementation and outcomes. Implementation encompasses the project's activities and deliverables. Outcomes are changes brought about by the project (e.g., expected outcomes), such as — but not limited to — changes related to student learning, persistence, retention, graduation, employment, faculty knowledge and pedagogical skills, broadening participation in STEM, and enhancing institutional capacity.
- Alignment of project activities and evaluation activities: The plan must provide a clear picture of specific data sources, data collection instruments, and methods that will be employed to address the evaluation questions or

criteria, and how data will be analyzed and interpreted to answer the evaluation questions and reach conclusions about the quality of the project's implementation and outcomes

- Design: The evaluation plan describes how the evaluation will incorporate formative evaluation results to improve the project and how the project team is involved with this part of the process.

- Responsibility: The evaluation plan must clearly state which member(s) of the project team will be responsible for managing and implementing which evaluative activities, and how the project team will incorporate results of the project's review process into the ongoing management of the project.

- Timeline: A timeline for the evaluation should identify when data will be collected, when reports will be submitted, and the frequency of communication between the evaluator and project personnel.

The following references may be helpful in designing an evaluation plan:

- Evaluation tools for Undergraduate Research (EvaluateUR and EvaluateUR-CURE), and for STEM competitions (Evaluate-Compete): https://serc.carleton.edu/evaluateur/index.html ↗

- Indigenous Evaluation Framework (AIHEC): https://portalcentral.aihec.org/Indigeval/Pages/Document-Collections.aspx ↗

- The EvaluATE Center (https://evalu-ate.org/ ↗)

- Common Guidelines for Research & Development, available at: https://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf13126

- The 2010 User-Friendly Handbook for Project Evaluation, available at: https://www.informalscience.org/sites/default/files/TheUserFriendlyGuide.pdf ↗

- Framework for Evaluating Impacts of Informal Science Education Projects, available at: https://www.informalscience.org/sites/default/files/Eval_Framework.pdf ↗

- User-Friendly Handbook for Mixed Method Evaluations, available at: https://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf97153

- Framework for Evaluating Impacts of Broadening Participation Projects, available at: https://nsf-gov-resources.nsf.gov/2022-03/framework-evaluating-impacts-broadening-participation-projects_1101.pdf

Dissemination/Communication Plan

All ITYC proposals must include a communication strategy for dissemination of project outcomes to interested communities including, where appropriate, public audiences, scholars, and local, regional, and national decision makers. Creative approaches that reach broader audiences are strongly encouraged. Proposals must identify the key elements of a communication plan, e.g., specific audiences and identification of the channels, media, and technologies appropriate for reaching these audiences.

Sustainability

Proposals to this program should communicate a reasonable plan for sustainability. It is expected that some aspects of the project will be sustained or institutionalized past the period of award funding. Institutions receiving the budget and time incentive (additional $100,000 to support a 4th year), for example, may describe efforts that result in long term and sustainable infrastructure that could support continued sponsored work past the period of award funding.

Project Management

All ITYC proposals need to explicitly address project management in terms of how the team will collaborate and embody equitable practices for collaboration for everyone involved in the project.

- Describe the composition, experience, and expertise of the project's Leadership Team, which may include senior personnel, subawardees, consultants, and others, depending on the project, in addition to the PI and co-PIs. The description provided should enable reviewers to assess the alignment of the team's lived experiences and professional capabilities that are relevant to the proposed project.

- In addition to the Leadership Team, describe additional contributors who, as appropriate for the project, may include STEM professionals, collaborators, researchers, advisory board members, evaluators, consultants, and contractors. The description provided should enable reviewers to assess the alignment of the contributors' lived experiences and professional capabilities that are relevant to their proposed contributions to the project.
- Describe how the collaborations relevant to the project formed or evolved. All collaborative proposals require a robust management plan that describes the role of contributors in leadership positions from each institution.
- Describe the project's decision-making processes and how they align with the project's conceptualization of equity, belonging, and broadening participation.
- Delineate a schedule or work plan with major milestones for key project tasks.

Results from Prior NSF Support

If applicable, the Project Description must include a subsection on Results from Prior NSF Support, and this subsection must cover NSF awards pertaining to the new proposal for projects in which the PI or co-PI have been involved (including NSF subawards). Awards from other sources that directly impact the proposed work should also be included. This subsection must contain specific outcomes and results including metrics to demonstrate the impact of the project activities. If the project team has had no prior support pertaining to the new proposal, this must be stated in the proposal. **It is not required to have prior support to be successful in this program.**

6. References Cited

A References Cited section must be included as a separate document from the 15-page Project Description. Literature cited must specifically relate to the proposed project, and the Project Description should make clear how each reference has played a role in the motivation for or design of the project. References should draw on the discipline-based education research literature, on the literature in STEM teaching and learning and on research literature on higher education. If no references are cited, the section should state that no references were cited.

7. Facilities, Equipment & Other Resources

See PAPPG Chapter II.D.2.g

8. Senior Personnel Documents

Biographical Sketches: In accordance with the guidance contained in the PAPPG, a separate biographical sketch must be provided for everyone designated as senior personnel on the project.

Current and Pending Support: In accordance with the guidance contained in the PAPPG, current and pending support information must be separately must be provided for each individual designated as senior personnel on the project.

Collaborators and Other Affiliations (COA) Information: In accordance with the guidance contained in the PAPPG, COA information must be separately provided for each individual designated as senior personnel on the project.

9. Data Management Plan

Proposers should provide a detailed data management plan. Transparency requires that the Federal agencies share how they are maximizing outcomes of Federal STEM investments and activities and ensuring broad benefit to the public. Proposers are encouraged to review the PAPPG for guidance on preparing a Data Management Plan.

10. Postdoctoral Mentoring Plan (if applicable)

Required when funding is requested for postdoctoral scholars in Section B of the budget. See PAPPG Chapter II for instructions for the preparation of this item.

11. Special Information and Supplementary Documentation:

Note: Supplementary Documents are distinct from Appendices, as stipulated in the PAPPG: Appendices may not be included unless a formal deviation has been authorized. See PAPPG Chapter II for more information about deviations.

Allowable Additional Supplementary Documents:

Letters of Collaboration that document what is being committed that is of significance to the project are encouraged. Letters that merely endorse the project or offer nonspecific support for project activities must not be included.

A Biographical Sketch of the evaluator not a CV or resume. The addition of other documents in this section, except those specified above or required by the PAPPG, may result in the proposal being returned without review.

B. Budgetary Information

Cost Sharing:

Inclusion of voluntary committed cost sharing is prohibited.

Other Budgetary Limitations:

Budgets and budget justifications submitted to this solicitation must reflect an equitable distribution of funds based on the proposed scope of the project. All budget requests must be consistent with the proposed scope and duration and cannot exceed the maximum permitted for this competition. Proposers to the ITYC program should provide a budget for each year of support requested. The maximum duration for a project is three years (four years if the project meets the criteria for the $100,000 incentive). Inclusion of voluntary committed cost sharing is prohibited.

Faculty Release Time/Extra Compensation Above Base Salary: **Faculty release time and/or faculty stipends to carry out project work that goes beyond the normal faculty duties is allowed. Salary compensation above 2 months salary must be disclosed and justified in the Budget Justification.** Extra service pay normally represents overload compensation, subject to institutional compensation policies above and beyond the Institutional Base Salary (IBS).

Administrative Support: The salaries of administrative and clerical staff should normally be considered part of indirect costs. However, these may be applied as direct costs if the conditions of 2 CFR § 200.413 are met. If included, the costs must be clearly documented in the budget justification and in line with the scope of the project.

Professional Development Conferences/Meetings: In proposals that involve professional development activities, reasonable travel costs and costs for subsistence (lodging and meals) during the meeting may be included in project budgets. In addition, funds may be requested for a reasonable stipend per meeting day for participants; requests for such stipends must be specific to the target audience and must be fully justified--for example, to assure participation by faculty with few professional development opportunities or from institutions that justify need.

Professional Development Workshops: In proposals that involve professional development workshops, reasonable travel costs and costs for subsistence (lodging and meals) during the workshop may be included in project budgets. In addition, funds may be requested for a reasonable stipend per workshop day for participants; requests for such stipends must be specific to the target audience and must be fully justified, for example, to assure participation by faculty with few professional development opportunities or from institutions that justify need.

Equipment: Requested equipment must be essential components of proposed deliverables. Equipment costs must not exceed 30% of the total NSF budget requested. Equipment requests must be clearly disclosed in the proposal budget, justified in the budget justification as to how it is required to carry out the research or enrich experiential learning activities, and be included in the NSF award budget. For budgeted research funds exceeding 30% of the final budget, PIs must justify how this component plays a significant role in the enhancement of undergraduate education.

Evaluation: The funds to support an evaluator independent of the project must be requested. The requested funds must match the scope of the proposed evaluative activities. The evaluator may be employed by a project's home institution, as long as he or she works in a separate organizational unit (e.g., a different department) that has a different reporting line

than that of the project's home unit. The project should engage project staff and project participants to work with the evaluator to improve the quality of data collected and feasibility of conducting the evaluation.

Note: NSF funds may not be used to support expenditures that would normally be made in the absence of an award, such as costs for routine teaching activities (including curriculum development) and laboratory upgrades (supplies and computers).

NSF project funds may **not** be used for:

- Student scholarships (please see the NSF S-STEM program for scholarships for students);
- replacement equipment or instrumentation that does not significantly improve instructional capability;
- teaching aids (e.g., films, slides, "drill and practice" software);
- vehicles, trailers, laboratory furnishings, or general utility items such as office equipment (including word-processing equipment), benches, tables, desks, chairs, storage cases, and routine supplies;
- maintenance equipment and maintenance or service contracts;
- the modification, construction, or furnishing of laboratories or other buildings;
- the installation of equipment or instrumentation (as distinct from the on-site assembly of multi-component instruments--which is an allowable charge).

C. Due Dates

- **Full Proposal Deadline(s)** (due by 5 p.m. submitter's local time):

  December 13, 2023

  Second Wednesday in December, Annually Thereafter

D. Research.gov/Grants.gov Requirements

For Proposals Submitted Via Research.gov:

To prepare and submit a proposal via Research.gov, see detailed technical instructions available at: https://www.research.gov/research-portal/appmanager/base/desktop?_nfpb=true&_pageLabel=research_node_display&_nodePath=/researchGov/Service/Desktop/ProposalPreparationandSubmission.html. For Research.gov user support, call the Research.gov Help Desk at 1-800-673-6188 or e-mail rgov@nsf.gov. The Research.gov Help Desk answers general technical questions related to the use of the Research.gov system. Specific questions related to this program solicitation should be referred to the NSF program staff contact(s) listed in Section VIII of this funding opportunity.

For Proposals Submitted Via Grants.gov:

Before using Grants.gov for the first time, each organization must register to create an institutional profile. Once registered, the applicant's organization can then apply for any federal grant on the Grants.gov website. Comprehensive information about using Grants.gov is available on the Grants.gov Applicant Resources webpage: https://www.grants.gov/web/grants/applicants.html. In addition, the NSF Grants.gov Application Guide (see link in Section V.A) provides instructions regarding the technical preparation of proposals via Grants.gov. For Grants.gov user support, contact the Grants.gov Contact Center at 1-800-518-4726 or by email: support@grants.gov. The Grants.gov Contact Center answers general technical questions related to the use of Grants.gov. Specific questions related to this program solicitation should be referred to the NSF program staff contact(s) listed in Section VIII of this solicitation.

Submitting the Proposal: Once all documents have been completed, the Authorized Organizational Representative (AOR) must submit the application to Grants.gov and verify the desired funding opportunity and agency to which the application is submitted. The AOR must then sign and submit the

application to Grants.gov. The completed application will be transferred to Research.gov for further processing.

Proposers that submitted via Research.gov may use Research.gov to verify the status of their submission to NSF. For proposers that submitted via Grants.gov, until an application has been received and validated by NSF, the Authorized Organizational Representative may check the status of an application on Grants.gov. After proposers have received an e-mail notification from NSF, Research.gov should be used to check the status of an application.

VI. NSF Proposal Processing And Review Procedures

Proposals received by NSF are assigned to the appropriate NSF program for acknowledgement and, if they meet NSF requirements, for review. All proposals are carefully reviewed by a scientist, engineer, or educator serving as an NSF Program Officer, and usually by three to ten other persons outside NSF either as *ad hoc* reviewers, panelists, or both, who are experts in the particular fields represented by the proposal. These reviewers are selected by Program Officers charged with oversight of the review process. Proposers are invited to suggest names of persons they believe are especially well qualified to review the proposal and/or persons they would prefer not review the proposal. These suggestions may serve as one source in the reviewer selection process at the Program Officer's discretion. Submission of such names, however, is optional. Care is taken to ensure that reviewers have no conflicts of interest with the proposal. In addition, Program Officers may obtain comments from site visits before recommending final action on proposals. Senior NSF staff further review recommendations for awards. A flowchart that depicts the entire NSF proposal and award process (and associated timeline) is included in PAPPG Exhibit III-1.

A comprehensive description of the Foundation's merit review process is available on the NSF website at: https://www.nsf.gov/bfa/dias/policy/merit_review/.

Proposers should also be aware of core strategies that are essential to the fulfillment of NSF's mission, as articulated in *Leading the World in Discovery and Innovation, STEM Talent Development and the Delivery of Benefits from Research - NSF Strategic Plan for Fiscal Years (FY) 2022 - 2026*. These strategies are integrated in the program planning and implementation process, of which proposal review is one part. NSF's mission is particularly well-implemented through the integration of research and education and broadening participation in NSF programs, projects, and activities.

One of the strategic objectives in support of NSF's mission is to foster integration of research and education through the programs, projects, and activities it supports at academic and research institutions. These institutions must recruit, train, and prepare a diverse STEM workforce to advance the frontiers of science and participate in the U.S. technology-based economy. NSF's contribution to the national innovation ecosystem is to provide cutting-edge research under the guidance of the Nation's most creative scientists and engineers. NSF also supports development of a strong science, technology, engineering, and mathematics (STEM) workforce by investing in building the knowledge that informs improvements in STEM teaching and learning.

NSF's mission calls for the broadening of opportunities and expanding participation of groups, institutions, and geographic regions that are underrepresented in STEM disciplines, which is essential to the health and vitality of science and engineering. NSF is committed to this principle of diversity and deems it central to the programs, projects, and activities it considers and supports.

A. Merit Review Principles and Criteria

The National Science Foundation strives to invest in a robust and diverse portfolio of projects that creates new knowledge and enables breakthroughs in understanding across all areas of science and engineering research and education. To identify which projects to support, NSF relies on a merit review process that incorporates consideration of both the technical aspects of a proposed project and its potential to contribute more broadly to advancing NSF's mission "to promote the progress of science; to advance the national health, prosperity, and welfare; to secure the national defense; and for other purposes." NSF makes every effort to conduct a fair, competitive, transparent merit review process for the selection of projects.

1. Merit Review Principles

These principles are to be given due diligence by PIs and organizations when preparing proposals and managing projects, by reviewers when reading and evaluating proposals, and by NSF program staff when determining whether or not to recommend proposals for funding and while overseeing awards. Given that NSF is the primary federal agency charged with nurturing and supporting excellence in basic research and education, the following three principles apply:

- All NSF projects should be of the highest quality and have the potential to advance, if not transform, the frontiers of knowledge.

- NSF projects, in the aggregate, should contribute more broadly to achieving societal goals. These "Broader Impacts" may be accomplished through the research itself, through activities that are directly related to specific research projects, or through activities that are supported by, but are complementary to, the project. The project activities may be based on previously established and/or innovative methods and approaches, but in either case must be well justified.

- Meaningful assessment and evaluation of NSF funded projects should be based on appropriate metrics, keeping in mind the likely correlation between the effect of broader impacts and the resources provided to implement projects. If the size of the activity is limited, evaluation of that activity in isolation is not likely to be meaningful. Thus, assessing the effectiveness of these activities may best be done at a higher, more aggregated, level than the individual project.

With respect to the third principle, even if assessment of Broader Impacts outcomes for particular projects is done at an aggregated level, PIs are expected to be accountable for carrying out the activities described in the funded project. Thus, individual projects should include clearly stated goals, specific descriptions of the activities that the PI intends to do, and a plan in place to document the outputs of those activities.

These three merit review principles provide the basis for the merit review criteria, as well as a context within which the users of the criteria can better understand their intent.

2. Merit Review Criteria

All NSF proposals are evaluated through use of the two National Science Board approved merit review criteria. In some instances, however, NSF will employ additional criteria as required to highlight the specific objectives of certain programs and activities.

The two merit review criteria are listed below. **Both** criteria are to be given **full consideration** during the review and decision-making processes; each criterion is necessary but neither, by itself, is sufficient. Therefore, proposers must fully address both criteria. (PAPPG Chapter II.D.2.d(i). contains additional information for use by proposers in development of the Project Description section of the proposal). Reviewers are strongly encouraged to review the criteria, including PAPPG Chapter II.D.2.d(i), prior to the review of a proposal.

When evaluating NSF proposals, reviewers will be asked to consider what the proposers want to do, why they want to do it, how they plan to do it, how they will know if they succeed, and what benefits could accrue if the project is successful. These issues apply both to the technical aspects of the proposal and the way in which the project may make broader contributions. To that end, reviewers will be asked to evaluate all proposals against two criteria:

- **Intellectual Merit:** The Intellectual Merit criterion encompasses the potential to advance knowledge; and

- **Broader Impacts:** The Broader Impacts criterion encompasses the potential to benefit society and contribute to the achievement of specific, desired societal outcomes.

The following elements should be considered in the review for both criteria:

1. What is the potential for the proposed activity to
    a. Advance knowledge and understanding within its own field or across different fields (Intellectual Merit); and
    b. Benefit society or advance desired societal outcomes (Broader Impacts)?

2. To what extent do the proposed activities suggest and explore creative, original, or potentially transformative concepts?

3. Is the plan for carrying out the proposed activities well-reasoned, well-organized, and based on a sound rationale? Does the plan incorporate a mechanism to assess success?

4. How well qualified is the individual, team, or organization to conduct the proposed activities?

5. Are there adequate resources available to the PI (either at the home organization or through collaborations) to carry out the proposed activities?

Broader impacts may be accomplished through the research itself, through the activities that are directly related to specific research projects, or through activities that are supported by, but are complementary to, the project. NSF values the advancement of scientific knowledge and activities that contribute to achievement of societally relevant outcomes. Such outcomes include, but are not limited to: full participation of women, persons with disabilities, and other underrepresented groups in science, technology, engineering, and mathematics (STEM); improved STEM education and educator development at any level; increased public scientific literacy and public engagement with science and technology; improved well-being of individuals in society; development of a diverse, globally competitive STEM workforce; increased partnerships between academia, industry, and others; improved national security; increased economic competitiveness of the United States; and enhanced infrastructure for research and education.

Proposers are reminded that reviewers will also be asked to review the Data Management Plan and the Postdoctoral Researcher Mentoring Plan, as appropriate.

Additional Solicitation Specific Review Criteria

As ITYC is an NSF Broadening Participation Focused program, it is expected that proposed projects will enhance access to and participation in STEM learning.

In addition to considering the two general NSF Merit Review Criteria, all ITYC proposals are required to address within the Project Description the Solicitation-Specific Review Criteria identified below. Reviewers will be asked to evaluate the proposal based on these criteria:

- In what ways does the proposal reflect an understanding of the target population of students, faculty and/or other professional such as assets brought to the project, interests, and/or lived experiences?

- To what extent is an understanding of the target population reflected throughout the proposed work (e.g., team composition and management, design and development processes and activities, budget allocations, etc.)?

B. Review and Selection Process

Proposals submitted in response to this program solicitation will be reviewed by Ad hoc Review and/or Panel Review.

Reviewers will be asked to evaluate proposals using two National Science Board approved merit review criteria and, if applicable, additional program specific criteria. A summary rating and accompanying narrative will generally be completed and submitted by each reviewer and/or panel. The Program Officer assigned to manage the proposal's review will consider the advice of reviewers and will formulate a recommendation.

After scientific, technical and programmatic review and consideration of appropriate factors, the NSF Program Officer recommends to the cognizant Division Director whether the proposal should be declined or recommended for award. NSF strives to be able to tell applicants whether their proposals have been declined or recommended for funding within six months. Large or particularly complex proposals or proposals from new awardees may require additional review and processing time. The time interval begins on the deadline or target date, or receipt date, whichever is later. The interval ends when the Division Director acts upon the Program Officer's recommendation.

After programmatic approval has been obtained, the proposals recommended for funding will be forwarded to the Division of Grants and Agreements or the Division of Acquisition and Cooperative Support for review of business, financial, and policy implications. After an administrative review has occurred, Grants and Agreements Officers perform

the processing and issuance of a grant or other agreement. Proposers are cautioned that only a Grants and Agreements Officer may make commitments, obligations or awards on behalf of NSF or authorize the expenditure of funds. No commitment on the part of NSF should be inferred from technical or budgetary discussions with a NSF Program Officer. A Principal Investigator or organization that makes financial or personnel commitments in the absence of a grant or cooperative agreement signed by the NSF Grants and Agreements Officer does so at their own risk.

Once an award or declination decision has been made, Principal Investigators are provided feedback about their proposals. In all cases, reviews are treated as confidential documents. Verbatim copies of reviews, excluding the names of the reviewers or any reviewer-identifying information, are sent to the Principal Investigator/Project Director by the Program Officer. In addition, the proposer will receive an explanation of the decision to award or decline funding.

VII. Award Administration Information

A. Notification of the Award

Notification of the award is made to *the submitting organization* by an NSF Grants and Agreements Officer. Organizations whose proposals are declined will be advised as promptly as possible by the cognizant NSF Program administering the program. Verbatim copies of reviews, not including the identity of the reviewer, will be provided automatically to the Principal Investigator. (See Section VI.B. for additional information on the review process.)

B. Award Conditions

An NSF award consists of: (1) the award notice, which includes any special provisions applicable to the award and any numbered amendments thereto; (2) the budget, which indicates the amounts, by categories of expense, on which NSF has based its support (or otherwise communicates any specific approvals or disapprovals of proposed expenditures); (3) the proposal referenced in the award notice; (4) the applicable award conditions, such as Grant General Conditions (GC-1)*; or Research Terms and Conditions* and (5) any announcement or other NSF issuance that may be incorporated by reference in the award notice. Cooperative agreements also are administered in accordance with NSF Cooperative Agreement Financial and Administrative Terms and Conditions (CA-FATC) and the applicable Programmatic Terms and Conditions. NSF awards are electronically signed by an NSF Grants and Agreements Officer and transmitted electronically to the organization via e-mail.

*These documents may be accessed electronically on NSF's Website at https://www.nsf.gov/awards/managing/award_conditions.jsp?org=NSF. Paper copies may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-8134 or by e-mail from nsfpubs@nsf.gov.

More comprehensive information on NSF Award Conditions and other important information on the administration of NSF awards is contained in the NSF *Proposal & Award Policies & Procedures Guide* (PAPPG) Chapter VII, available electronically on the NSF Website at https://www.nsf.gov/publications/pub_summ.jsp?ods_key=pappg.

Administrative and National Policy Requirements

Build America, Buy America

As expressed in Executive Order 14005, Ensuring the Future is Made in All of America by All of America's Workers (86 FR 7475), it is the policy of the executive branch to use terms and conditions of Federal financial assistance awards to maximize, consistent with law, the use of goods, products, and materials produced in, and services offered in, the United States.

Consistent with the requirements of the Build America, Buy America Act (Pub. L. 117-58, Division G, Title IX, Subtitle A, November 15, 2021), no funding made available through this funding opportunity may be obligated for an award unless all iron, steel, manufactured products, and construction materials used in the project are produced in the United States. For additional information, visit NSF's Build America, Buy America webpage.

C. Reporting Requirements

For all multi-year grants (including both standard and continuing grants), the Principal Investigator must submit an annual project report to the cognizant Program Officer no later than 90 days prior to the end of the current budget period. (Some programs or awards require submission of more frequent project reports). No later than 120 days following expiration of a grant, the PI also is required to submit a final project report, and a project outcomes report for the general public.

Failure to provide the required annual or final project reports, or the project outcomes report, will delay NSF review and processing of any future funding increments as well as any pending proposals for all identified PIs and co-PIs on a given award. PIs should examine the formats of the required reports in advance to assure availability of required data.

PIs are required to use NSF's electronic project-reporting system, available through Research.gov, for preparation and submission of annual and final project reports. Such reports provide information on accomplishments, project participants (individual and organizational), publications, and other specific products and impacts of the project. Submission of the report via Research.gov constitutes certification by the PI that the contents of the report are accurate and complete. The project outcomes report also must be prepared and submitted using Research.gov. This report serves as a brief summary, prepared specifically for the public, of the nature and outcomes of the project. This report will be posted on the NSF website exactly as it is submitted by the PI.

More comprehensive information on NSF Reporting Requirements and other important information on the administration of NSF awards is contained in the *NSF Proposal & Award Policies & Procedures Guide* (PAPPG) Chapter VII, available electronically on the NSF Website at https://www.nsf.gov/publications/pub_summ.jsp?ods_key=pappg.

VIII. Agency Contacts

Please note that the program contact information is current at the time of publishing. See program website for any updates to the points of contact.

General inquiries regarding this program should be made to:

- General inquires to be addressed to, telephone: (703) 292-8670, email: iuse@nsf.gov

For questions related to the use of NSF systems contact:

- NSF Help Desk: 1-800-673-6188
- Research.gov Help Desk e-mail: rgov@nsf.gov

For questions relating to Grants.gov contact:

- Grants.gov Contact Center: If the Authorized Organizational Representatives (AOR) has not received a confirmation message from Grants.gov within 48 hours of submission of application, please contact via telephone: 1-800-518-4726; e-mail:support@grants.gov.

IX. Other Information

The NSF website provides the most comprehensive source of information on NSF Directorates (including contact information), programs and funding opportunities. Use of this website by potential proposers is strongly encouraged. In addition, "NSF Update" is an information-delivery system designed to keep potential proposers and other interested parties apprised of new NSF funding opportunities and publications, important changes in proposal and award policies and procedures, and upcoming NSF Grants Conferences. Subscribers are informed through e-mail or the user's Web browser each time new publications are issued that match their identified interests. "NSF Update" also is available on NSF's website.

Grants.gov provides an additional electronic capability to search for Federal government-wide grant opportunities. NSF funding opportunities may be accessed via this mechanism. Further information on Grants.gov may be obtained at https://www.grants.gov.

About The National Science Foundation

The National Science Foundation (NSF) is an independent Federal agency created by the National Science Foundation Act of 1950, as amended (42 USC 1861-75). The Act states the purpose of the NSF is "to promote the progress of science; [and] to advance the national health, prosperity, and welfare by supporting research and education in all fields of science and engineering."

NSF funds research and education in most fields of science and engineering. It does this through grants and cooperative agreements to more than 2,000 colleges, universities, K-12 school systems, businesses, informal science organizations and other research organizations throughout the US. The Foundation accounts for about one-fourth of Federal support to academic institutions for basic research.

NSF receives approximately 55,000 proposals each year for research, education and training projects, of which approximately 11,000 are funded. In addition, the Foundation receives several thousand applications for graduate and postdoctoral fellowships. The agency operates no laboratories itself but does support National Research Centers, user facilities, certain oceanographic vessels and Arctic and Antarctic research stations. The Foundation also supports cooperative research between universities and industry, US participation in international scientific and engineering efforts, and educational activities at every academic level.

Facilitation Awards for Scientists and Engineers with Disabilities (FASED) provide funding for special assistance or equipment to enable persons with disabilities to work on NSF-supported projects. See the *NSF Proposal & Award Policies & Procedures Guide* Chapter II.F.7 for instructions regarding preparation of these types of proposals.

The National Science Foundation has Telephonic Device for the Deaf (TDD) and Federal Information Relay Service (FIRS) capabilities that enable individuals with hearing impairments to communicate with the Foundation about NSF programs, employment or general information. TDD may be accessed at (703) 292-5090 and (800) 281-8749, FIRS at (800) 877-8339.

The National Science Foundation Information Center may be reached at (703) 292-5111.

The National Science Foundation promotes and advances scientific progress in the United States by competitively awarding grants and cooperative agreements for research and education in the sciences, mathematics, and engineering.
To get the latest information about program deadlines, to download copies of NSF publications, and to access abstracts of awards, visit the NSF Website at https://www.nsf.gov

- **Location:**   2415 Eisenhower Avenue, Alexandria, VA 22314

- **For General Information**   (703) 292-5111
  (NSF Information Center)**:**

- **TDD (for the hearing-impaired):**   (703) 292-5090

- **To Order Publications or Forms:**

      Send an e-mail to: nsfpubs@nsf.gov

        or telephone: (703) 292-8134

- **To Locate NSF Employees:**   (703) 292-5111

Privacy Act And Public Burden Statements

The information requested on proposal forms and project reports is solicited under the authority of the National Science Foundation Act of 1950, as amended. The information on proposal forms will be used in connection with the selection of qualified proposals; and project reports submitted by awardees will be used for program evaluation and reporting within

the Executive Branch and to Congress. The information requested may be disclosed to qualified reviewers and staff assistants as part of the proposal review process; to proposer institutions/grantees to provide or obtain data regarding the proposal review process, award decisions, or the administration of awards; to government contractors, experts, volunteers and researchers and educators as necessary to complete assigned work; to other government agencies or other entities needing information regarding applicants or nominees as part of a joint application review process, or in order to coordinate programs or policy; and to another Federal agency, court, or party in a court or Federal administrative proceeding if the government is a party. Information about Principal Investigators may be added to the Reviewer file and used to select potential candidates to serve as peer reviewers or advisory committee members. See System of Record Notices, NSF-50, "Principal Investigator/Proposal File and Associated Records," and NSF-51, "Reviewer/Proposal File and Associated Records." Submission of the information is voluntary. Failure to provide full and complete information, however, may reduce the possibility of receiving an award.

An agency may not conduct or sponsor, and a person is not required to respond to, an information collection unless it displays a valid Office of Management and Budget (OMB) control number. The OMB control number for this collection is 3145-0058. Public reporting burden for this collection of information is estimated to average 120 hours per response, including the time for reviewing instructions. Send comments regarding the burden estimate and any other aspect of this collection of information, including suggestions for reducing this burden, to:

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